

**The Prevalence of Mental Illness in Child and Adolescent Refugees and Asylum Seekers:  
a systematic review and meta-analysis**

**Running Title:** Review of Mental Illness of Child Refugees

**Objective:** Over half of the world's refugee population are under the age of 18 years.

Therefore a timely update of the prevalence of mental illness in child and adolescent refugee populations is needed. This systematic review aims to summarise the current body of evidence for the prevalence of mental illness in global child and adolescent refugee populations and overcome methodological limitations of individual studies.

**Method:** Eight electronic databases, grey literature, and Google Scholar were searched for articles from 1 January 2003 to 5 February 2018. Strict inclusion criteria regarding the methodology of mental illness diagnosis were imposed. Study quality was assessed using a template according to study design, and study heterogeneity using  $I^2$  statistic. Random effects meta-analyses results were presented given heterogeneity among studies. The protocol for this systematic review was registered with PROSPERO (CRD42016046349).

**Results:** Eight studies were eligible, providing results for 779 child and adolescent refugee and asylum seekers, with studies conducted in five countries. For recently displaced children (less than two years), the reported prevalence of post-traumatic stress disorder (PTSD) was 35% (95% CI 29-41), depression was 13.7% (95% CI 9.9-18.5), and anxiety disorders were 19.30% (95% CI 14.9-24.6). Methodological quality of included studies was high, with only two papers deemed of moderate risk of bias.

**Conclusion:** Refugee and asylum seeker children have high rates of PTSD, depression, and anxiety. These results highlight the need for immediate mental health intervention to assist adjustment to life post-migration.

## **Introduction**

Children and adolescents comprise a substantial proportion of the current refugee population. According to the United Nations High Commissioner for Refugees (UNHCR), 51% of the world's refugees and asylum-seekers are under the age of 18. (UNHCR, 2018) Refugee children and adolescents are most likely to have witnessed or experienced violence as a result of conflict in their home nations. Their lives have been significantly disrupted and as a result of this forced displacement, many of them endure harsh living conditions, scarcity of adequate food and water, deprivation of basic health care, and separation or loss of family members, including their parents. Education is disrupted, sometimes temporarily and for others permanently. (BEAN 2007; MEASHAM 2014) Unaccompanied refugee minors face even greater risks without parental support, including increased vulnerability to traffickers and exploitation. Experiencing violence, danger and instability at a young age and at critical points in a child's cognitive and emotional development can have a lasting psychological impact. (REED & FAZEL 2012) While many young people demonstrate resilience and an ability to overcome the chaos and challenges of forced displacement, others are at risk of developing serious mental illness. (FAZEL 2018; BETANCOURT et al 2012; KARAM 2008)

With the population of refugee and asylum seeker children and adolescents ever increasing, there is mounting concern about the impact of conflict, trauma and displacement on the developing mind. This creates a critical need for high quality research focusing on the mental health of refugee children and adolescents. However, as identified by Reed et al. (2012) a cautious approach is required to overcome some of the challenges of conducting research with this population. Special consideration must be given to ethical concerns, representative sampling, and the diagnostic validity of study methods. (REED et al 2012) Previous research has largely relied on the use of symptom rating measures and self-report questionnaires. This can explain some of the variability in the reported prevalence of mental illness in this population as these

types of measures tend to overestimate symptomatology (DE JONG 2003; RICHARDSON et al 2011; LIM 2018). A recent review on the epidemiology of post-traumatic stress disorder (PTSD) and depression in refugee minors highlighted the need for more rigorous research determining diagnoses by those ‘qualified to formally diagnose’, in order to increase the accuracy of the reported prevalence of these conditions. (REAVELL 2017)

Previous systematic and narrative reviews examining the prevalence of mental illness in child and adolescent refugee populations have included studies that relied on self-report questionnaires and cut off scores to determine diagnoses. (BRONSTEIN 2011; GIACCO 2017; TURRINI 2017) It is our understanding that no systematic review has incorporated a rigorous inclusion criterion regarding diagnosis determination. Previous research has also largely focussed on PTSD rather than a more comprehensive range of psychological disorders. (REED 2012) A 2005 systemic review and meta-analysis of refugee children and adolescents resettled in high income western countries only identified five studies of PTSD (from 1996 to 2002) that met their inclusion criteria on a total of 260 refugee children,[REF] of which 11% were diagnosed with PTSD. No relevant studies of depression were identified in that systematic review. Given the increasing and changing nature of forced displacement, establishing current prevalence estimates is now timely. There is also a need for a systematic review to include refugee populations living in low and middle income countries as these nations host the majority of the world’s refugee populations. (GIACCO 2017) We have therefore conducted a systematic review which aims to overcome some of the methodological limitations of the current body of evidence and establish a current estimate of mental illness in child and adolescent refugee populations. This systematic review examines a range of reported mental illnesses including PTSD, depression, anxiety, attention-deficit/hyperactivity disorder (ADHD), and oppositional defiant disorder (ODD). The results from this systematic review can inform host nations and enable them to tailor what

preparation they do to the needs of those arriving and potentially allocate appropriate resources for the mental health assessment and care of refugee and asylum seeker children.

## **Method**

### **Search Strategy and Selection Criteria**

The protocol for this systematic review and meta-analysis was registered with PROSPERO CRD42016046349 ([https://www.crd.york.ac.uk/prospERO/display\\_record.php?RecordID=46349](https://www.crd.york.ac.uk/prospERO/display_record.php?RecordID=46349)). We have followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA).<sup>Ref</sup> A PRISMA checklist is provided in Supplement 1. For this systematic review and meta-analysis, studies pertaining to child and adolescent populations were extracted from a larger systematic search.

We undertook a systematic search, developed using the OVID platform and combining Medical Subject Headings (MeSH terms) with related text-based search words. The search terms were translated to other databases and the search methodology builds on that of Fazel et al. (2005). An example of the search strategy used in MEDLINE is provided in Supplement 2. Studies about refugees or asylum seekers in combination with terms related to mental illness, diagnosis, and trauma were searched across eight databases: MEDLINE; MEDLINE In-Process; EBM Reviews; Embase; PsycINFO; CINAHL; PILOTS and Web of Science. A search of grey literature was undertaken, using Open Grey and also Google Scholar. The search strategy contained no restrictions on publication language. The date limits were 1 January 2003 to 5 February 2018. This start date reflects the end date of the search conducted by Fazel et al.<sup>(2005)</sup> The reference lists of 67 systematic reviews, 13 of which pertained to child and adolescent samples, were identified through the search and screened for any further relevant articles. This resulted in the manual checking of 17 additional articles, 8 of which were relevant to child and adolescent populations.

Studies were included in this review if (i) the sample included refugee and/or asylum seeker children and/or adolescents, (ii) had a sample size larger than 50, and (iii) reported quantitative prevalence estimates of a mental illness as classified by the Diagnostic and Statistical Manual of Mental Disorders (DSM)<sup>Ref</sup> or the International Classification of Disease (ICD).<sup>Ref</sup> The diagnosis must have been made as a result of a clinical interview using a validated diagnostic assessment measure. Studies which based diagnoses solely on self-report questionnaires or symptomatology rating scales were excluded. The interview needed to have been conducted either by a mental health professional (psychiatrist, psychologist, psychiatric nurse) or other trained para-professional (psychology research assistant, trained researcher). In studies which administered the World Health Organization, World Mental Health Composite International Diagnostic Interview (WHO WMH-CIDI),<sup>Ref</sup> non-clinicians who had completed official WHO recommended training requirements were accepted. The WHO WMH-CIDI is a fully structured interview for the assessment of mental disorders intended for use by trained lay interviewers. Studies were selected if they had recruited representative samples of refugee children hence those recruiting participants solely from medical clinics were excluded to reduce selection bias. Studies stating that the sample included asylum seekers whose applications had been rejected were excluded if the results were not disaggregated, or if the mental health assessment was not conducted prior to rejection (when the individuals met the definition of asylum seekers). Qualitative or case report studies were excluded. When multiple articles used data from the same study, the article providing data that best met the search criteria was included.

Two reviewers (RB and MGH/GF) independently assessed all the titles, abstracts, and keywords of every article retrieved against the selection criteria. Full text articles were then assessed if the title and abstract suggested that the study met the selection criteria or if there was any doubt regarding eligibility of the article. Disagreements were resolved by discussion and where appropriate, we contacted the study authors for further information. The reviewers contacted 8

study authors to obtain further information regarding methodology and data, of which 7 responded. Studies in languages other than English were assessed first by a native speaker where possible or via Google translate, and then officially translated by a professional translation service if potentially meeting inclusion criteria.

### **Data Extraction and Analysis**

Using a fixed protocol two review authors (RB and MGH) independently extracted statistical data from the included studies into Stata software version 14.1 (StataCorp LP) for the meta-analysis. Study characteristics such as sample size, sampling framework, diagnostic instrument, diagnostic criteria, and use of native interviewer were also extracted. Meta-analysis results were expressed as prevalence estimates of mental illness calculated with 95% confidence intervals (CIs) in the pooled data. Random effects were presented given heterogeneity among studies. Heterogeneity was assessed using the  $I^2$  statistic. In the case of 5 or more studies being available, publication bias was assessed by visual inspection of funnel plots and applying Egger's test set at a threshold of a  $p$  value less than 0.05 to indicate funnel plot asymmetry. Prevalence rates were for current diagnoses with the exception of studies reporting 1-year prevalence as assessed by the WHO WMH-CIDI.<sup>(ref)</sup> Prevalence rates of mental illnesses were combined by direct summation of numerators and denominators across studies, thereby providing a pooled estimate.

Possible sources of heterogeneity between studies were investigated, where reported data allowed, by subgroup analyses. These included: sex, duration of displacement, visa status, use of native interviewer (whereby the diagnostic interview was conducted in the preferred language of the child or adolescent), and current residence status (residing in the local community versus refugee facility/reception centre).

### **Risk of Bias Appraisal**

Methodological quality of the included studies was assessed by two independent reviewers (RB and KMG) using a risk of bias assessment template (supplement 3) according to study design.<sup>(REF)</sup> This template incorporates the Newcastle-Ottawa Scale (NOS) for assessing the quality of nonrandomized studies in meta-analyses and include additional risk of bias components.<sup>(REF)</sup> It has been used in international evidence-based guidelines and other systematic reviews.<sup>(REF)</sup> Individual items related to study quality such as internal and external validity, reporting bias, confounding, and conflict of interest were assessed. Studies were assigned a rating of low, moderate, or high risk of bias. No disagreement occurred between the two reviewers regarding the quality ratings.

## **Results**



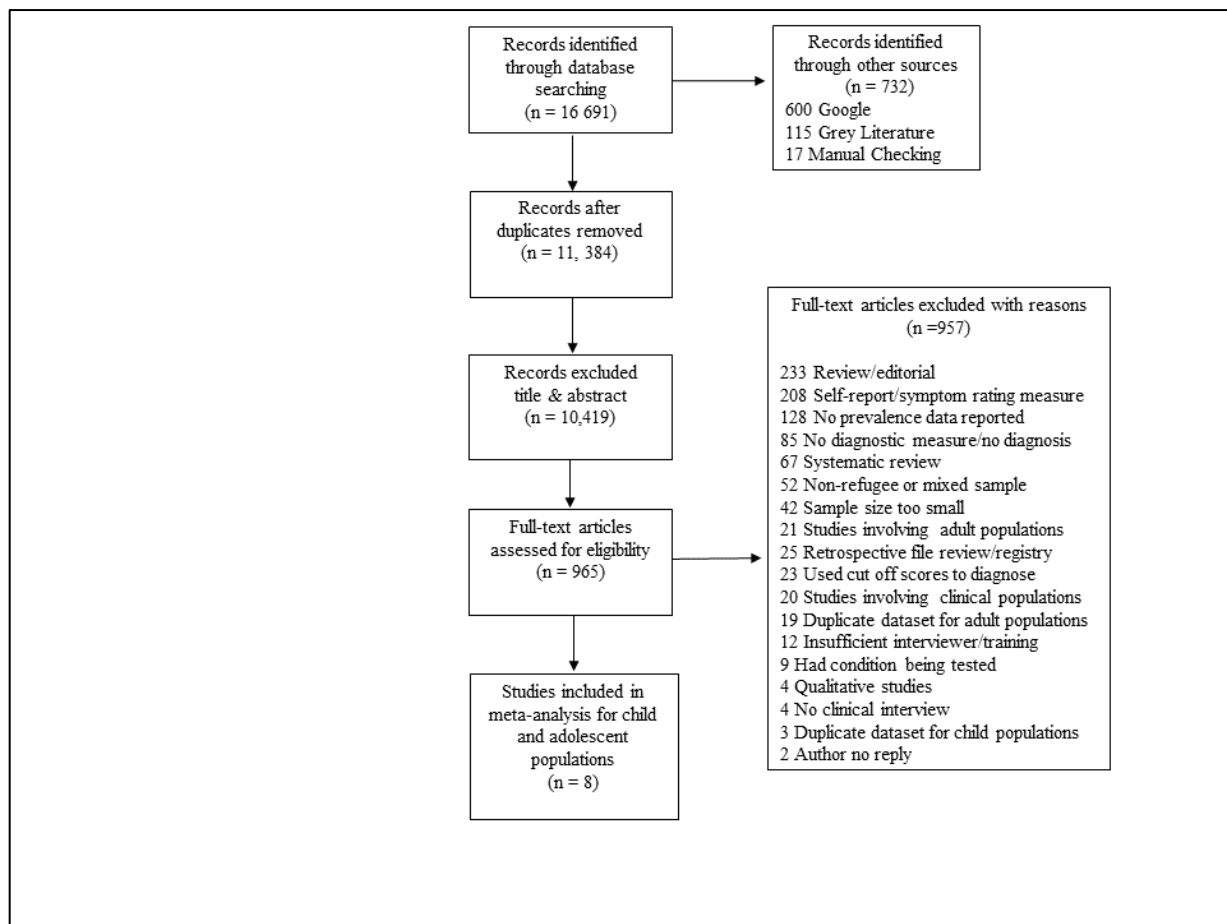


Figure 1: Search results and selection of studies reporting prevalence of mental illness among child and adolescent refugees and asylum seekers

The entire search, including electronic databases and other sources, yielded a total result of 17,423 records. A flowchart outlining the search results and selection of studies is provided in Figure 1. After removing the duplicates, 10,419 records were excluded based on title and abstract and a further 965 records were screened by full text retrieval. Eight studies met the inclusion criteria, after a final exclusion of three papers which reported duplicate datasets. One study was published in German and professionally translated for inclusion.<sup>Ruf</sup> The eight eligible studies provided data for a total of 779 child and adolescent refugees and asylum-seekers. Six studies included both children and adolescents in their samples, (Ahmad, Daud, Nasiroglu, Ruf, Sapmaz, Soykoek) however two studies assessed adolescents solely. (Gosnell, Jakobsen) Characteristics of the included

studies are provided in Table S1. The age range for each sample was consistent with the World Health Organization definition of child or adolescent (19 years or younger)<sup>(Ref)</sup> except for one sample, from a study specifically recruiting “unaccompanied asylum seeking children”, that contained some participants aged 20. Considering the focus of the study and that the mean age of participants ( $16.23 \pm 0.83$ ) was within the adolescent range, the authors decided to include it. Studies were undertaken in five countries: Germany (197 refugees),<sup>Ruf, Soykoek</sup> Malaysia (90),<sup>Gosnell</sup> Norway (160),<sup>Jakobsen</sup> Sweden (191),<sup>Ahmad, Daud</sup> and Turkey (144).<sup>Nasiroglu, Sapmaz</sup> Refugee samples were drawn from the Middle East (45%), a combination of Middle Eastern and African countries (31%), and Southern Asia and Middle East (11.5%). One study reported a sample originating from up to 15 different countries (12.5%).<sup>Ruf</sup> In two of the studies, a proportion of the participants had been born in the host nation, 31.4% ( $n=32$ )<sup>Ahmad</sup> and 4.8% ( $n=5$ ).<sup>Ruf</sup>

Seven diagnostic measures were used in the included studies to assess mental illness (Supplement 4). One of the measures, The Posttraumatic Stress Symptoms in Children (PTSS-C) was specifically developed as a cross-cultural semi-structured interview to diagnose PTSD.<sup>Ahmad</sup> Six studies made mention of the psychometric properties of the used instruments and/or previous use with child refugee populations.<sup>Ahmad, Daud, Gosnell, jakobsen, Ruf, Nasiroglu</sup> Four studies conducted the diagnostic interview in the native language of the child or adolescent,<sup>Ahmad, Daud, Nasiroglu, Sapmaz</sup> three with assistance from interpreters<sup>Gosnell, Jakobsen, Ruf</sup> and one study used a combination of native interviewers and interpreters.<sup>Soykoek</sup>

PTSD was investigated by seven studies, with data for a total of 681 children and adolescents.<sup>Ahmad, Daud, Gosnell, Jakobsen, Nasiroglu, Sapmaz, Soykoek</sup> Participants had a weighted mean age of 12.3 years and 40% were female. Overall, 22.71% (95% CI 12.79-32.64) were diagnosed with PTSD (Figure 2). There was substantial heterogeneity between the studies ( $I^2 = 91.1\%$ ,  $p = 0.000$ ), therefore subgroup analyses were conducted for duration of displacement, visa status, use of native interviewer, and current residence (Figure 3). The subgroup analysis for sex could not be

conducted due to a lack of reported data. PTSD prevalence was higher for those displaced less than two years and for those with an insecure visa status. Conducting the diagnostic interview in the native language of the child or adolescent and current community residence resulted in lower reported prevalence of PTSD.

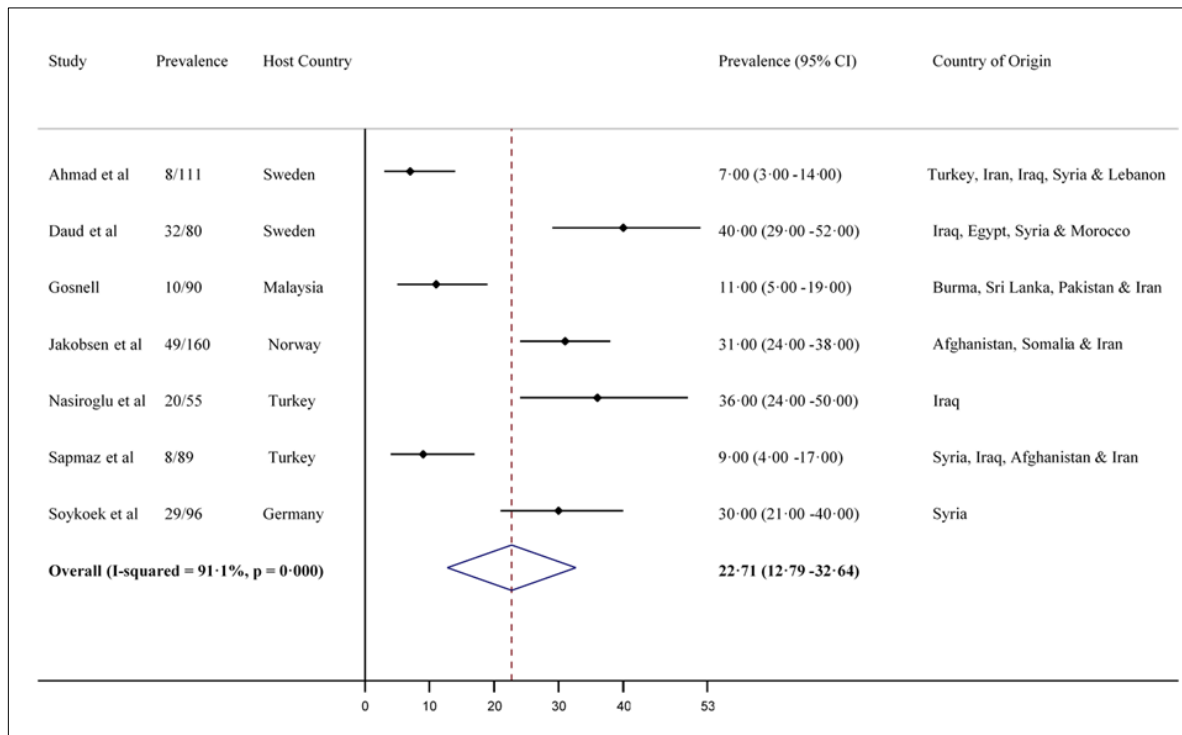


Figure 2: Prevalence of PTSD in child and adolescent refugees and asylum seekers  
Horizontal lines indicate 95% CIs; and open diamond denotes subtotals.

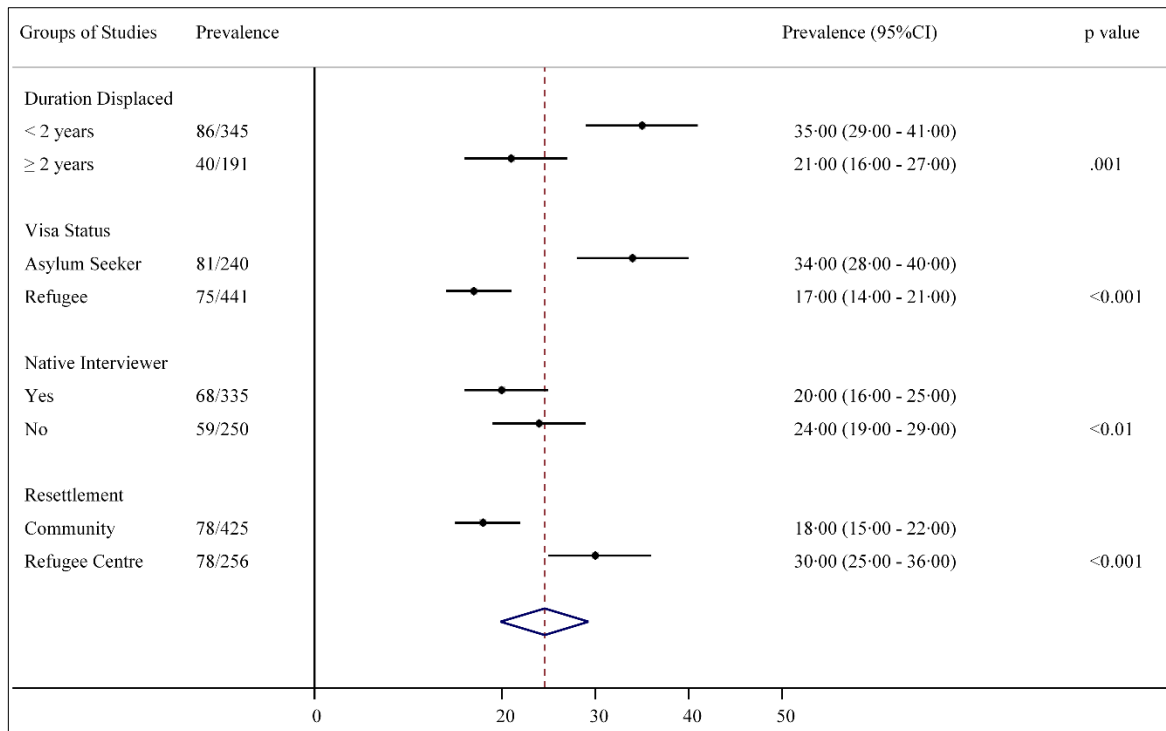


Figure 3: Prevalence of PTSD by various study characteristics  
*P* values derived from random-effects models; horizontal lines indicate 95% CIs.

Five studies of depression were identified providing data for a total of 492 children and adolescents. <sup>Gosnell, Jakobsen, Nasiroglu, Ruf, Sapmaz</sup> Participants had a weighted mean age of 12.9 years and 36% of the sample were female. One study<sup>Ruf</sup> reported gender data for the total sample ( $n=104$ ), however only 98 completed the full diagnostic assessment. Two studies reported prevalence of major depression <sup>Gosnell, Ruf</sup>, two studies reported prevalence of any depressive disorder <sup>Nasiroglu, Sapmaz</sup>, and one study reported prevalence of major depression and dysthymia, which was combined for the analysis <sup>Jakobsen</sup>. Overall, 13.81% (95% CI 5.96 -26.67) were diagnosed with depression (Figure 4). There was substantial heterogeneity between the studies ( $I^2 = 86.5\%$ ,  $p = 0.000$ ) so subgroup analyses were conducted for duration of displacement, visa status, use of native interviewer, and current residence (Figure 5). The subgroup analysis for sex could not be conducted due to a lack of reported data. Depression prevalence was higher for those displaced less than two years, those with refugee visa status, use of native interviewer for diagnostic assessment, and current community residence.

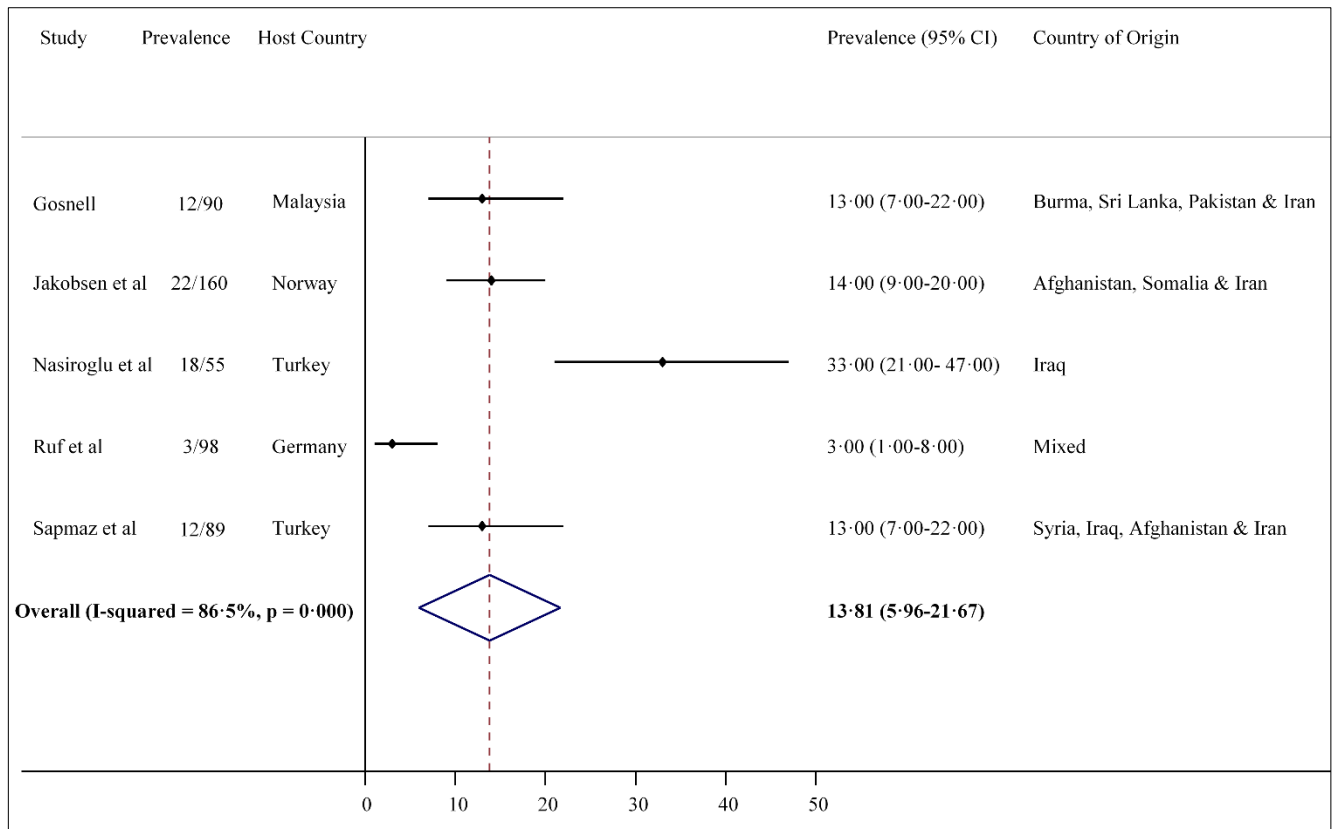


Figure 4: Prevalence of depression in child and adolescent refugees and asylum seekers  
Horizontal lines indicate 95% CIs; and open diamond denotes subtotals.

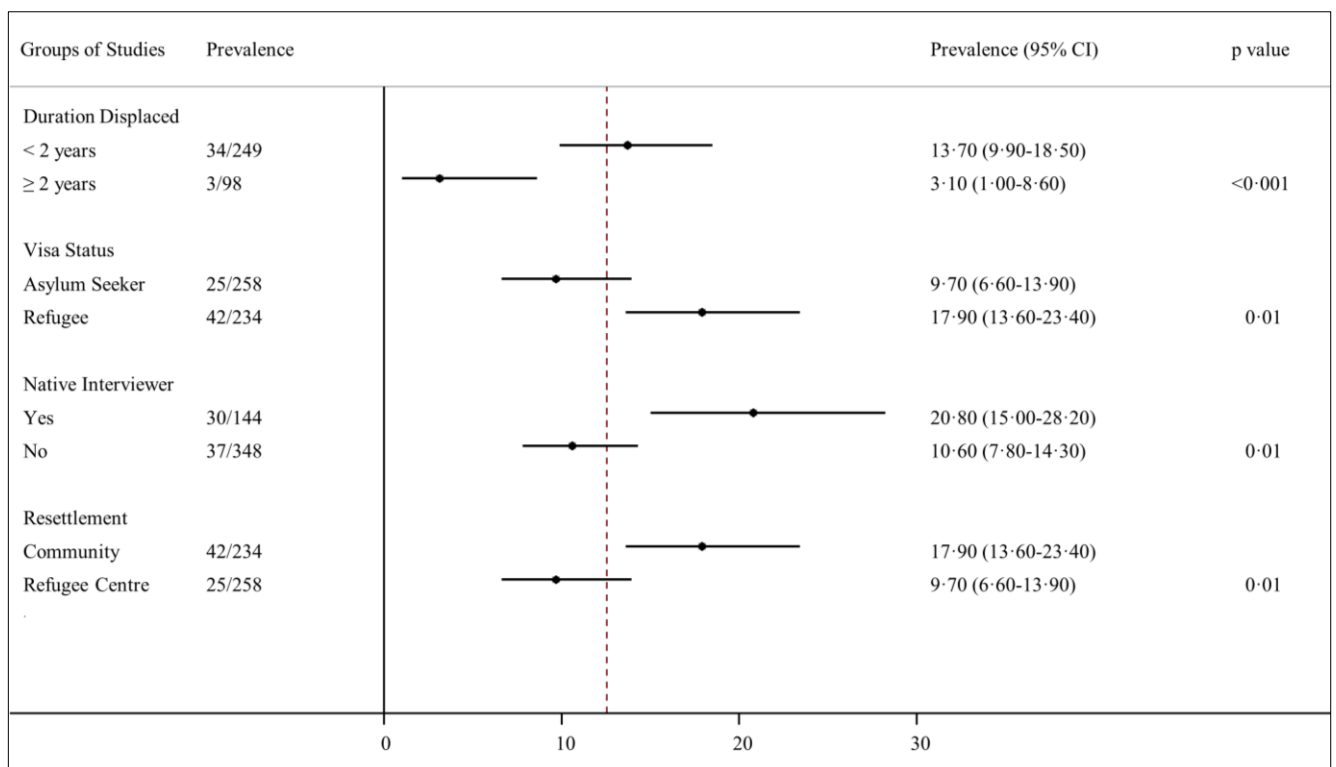


Figure 5: Prevalence of depression by various study characteristics  
P values derived from random-effects models; horizontal lines indicate 95% CIs.

Four studies reporting the prevalence of anxiety disorders were identified consisting of data for a total of 402 children and adolescents.<sup>Jakobsen, Nasiroglu, Ruf, Sapmaz</sup> Two studies reported diagnosis of any anxiety disorder<sup>Nasiroglu, Sapmaz</sup> and two studies provided a breakdown of diagnosis across individual anxiety disorders,<sup>Jakobsen, Ruf</sup> which were combined for analysis. These disorders included; generalised anxiety disorder, separation anxiety disorder, obsessive compulsive disorder, social anxiety disorder, agoraphobia, and specific phobia. Participants had a weighted mean age of 12.7 years and 32% of the sample were female. Overall, 15.77% (95% CI 8.04-23.50) were diagnosed with an anxiety disorder (Figure S1). There was substantial heterogeneity between the studies ( $I^2 = 76.0\%$ ,  $p = 0.006$ ) so subgroup analyses were conducted for duration of displacement, visa status, use of native interviewer, and current residence status (Figure S2, available online). Anxiety prevalence was higher for those displaced less than two years, with refugee visa status, use of native interviewer for diagnostic assessment, and current community residence.

Four studies reporting the prevalence of ADHD were identified consisting of data for a total of 322 children and adolescents.<sup>Daud, Nasiroglu, Ruf, Sapmaz</sup> Participants had a weighted mean age of 11 years and 52% of the sample were female. Overall, 8.6% (95% CI 1.08 – 16.12) were diagnosed with ADHD (Figure S3). There was substantial heterogeneity between the studies ( $I^2 = 84.9\%$ ,  $p = 0.000$ ) so sub group analyses were conducted for duration of displacement, visa status, use of native interviewer, and current residence status. ADHD prevalence was higher for those displaced longer than two years and for those with an insecure visa status (Figure S4, available online).

Two studies reported prevalence of ODD consisting of data for a total 178 children and adolescents.<sup>Daud, Ruf</sup> Participants had a weighted mean age of x years and 52% of the sample were

female. Overall, 1.69% (95% CI 0.78 - 4.16) were diagnosed with ODD (Figure S5, available online). There was a low level of heterogeneity between the studies ( $I^2 = 9.6\%$ ,  $p = 0.293$ ). Subgroup analyses were not conducted as there were only two studies.

## Publication Bias

There is some evidence of publication bias for PTSD and depression, as the  $p$  values were less than 0.05 (Egger test plots provided in Figure S6-7). However, these results should be interpreted with caution as they may be a reflection of the small number of studies published in the field. In an attempt to address potential publication bias, the search strategy for this review included a search of grey literature. However, no studies were found which met inclusion criteria. Assessment for publication bias was not performed for anxiety, ADHD, and ODD ( $n < 5$  studies).

## Risk of Bias

Six studies were assigned a low risk of bias and determined to be of high quality. <sup>Ahmad, Daud, Gosnell, Jakobsen, Ruf, Soykoek</sup> Two studies demonstrated moderate risk of bias. <sup>Nasiroglu, Sapmaz</sup> Moderate ratings were assigned to these studies as there were potential issues with the representativeness of their samples. In one study, there was a high rate of non-participation. Interviews were conducted with a relatively small number of participants compared to the total number screened. <sup>Nasiroglu</sup> In the other study, immigration lists were unable to be used for recruitment of families due to the high mobility of the population. Therefore, only families who had registered with the obstetrics and gynaecology department of the local hospitals were contacted for possible recruitment. <sup>Sapmaz</sup> No study was assigned a high risk of bias.

## Discussion

The results from this review confirms how the impact of refugee experiences on children and adolescents' mental health extends further than solely PTSD. In addition to the results of PTSD for this population, depression and anxiety disorders were also highly prevalent. PTSD, depression, and anxiety disorders were all higher for those displaced more recently. However, the prevalence of ADHD was higher amongst those displaced greater than two years. PTSD was reportedly higher for those with insecure visa status and temporary residence but the prevalence of depression and anxiety disorders were worse for those residing in the community.

Previous research has suggested that the use of native interviewers during mental health assessments results in lower reported prevalence of mental illness (FAZEL 2005). This was the case for PTSD, whereby lower prevalence was reported when the interviews were conducted in the child or adolescent's native language. However, for depression and anxiety the prevalence was higher when the interview was conducted in the native language and for ADHD the results were not significant.

In comparison to general population estimates, a meta-analysis of all trauma exposed children and adolescents reported a PTSD prevalence of 15.9% (95% CI 11.5-21.5) (ALISIC et al 2014). The results from this review reported an overall PTSD prevalence of 22.71%, however even higher for those displaced less than two years at 35%. In comparing these results to the other child data on serious mental illnesses, a meta-analysis of children and adolescents using data from community samples in 49 studies and across 27 countries provided data from 1985 to 2012 on a sample of 87,742 children and adolescents (POLANCZYK 2015). The reported worldwide pooled prevalence for any depressive disorder was 2.6% (95% CI 1.7 – 3.9), any anxiety disorder 6.5% (95% CI 4.7 – 9.1), ADHD 3.4% (95% CI 2.6 – 4.5) and ODD 3.6% (95% CI 2.8 – 4.7). The results from this systematic review show higher prevalence for depression, anxiety, and ADHD in refugee and asylum seeker populations. However, the prevalence of ODD is



comparable to these general population estimates, and in fact slightly lower in refugee and asylum seeker children.

The results from this review highlight two important considerations for clinical practice. Firstly, the immediate effects of pre-migration trauma, forced displacement and the post-migration environment on the mental health of child and adolescent refugee and asylum seekers. With the exception of ADHD, all of the other mental illnesses showed higher prevalence for those recently displaced (2 years or less) emphasizing the need for focus mental health care post-arrival into a country of refuge. Secondly in regards to PTSD, the results suggest a positive message concerning the impact and potential protective factors of psychosocial stability. By providing these children and adolescents with resolved visa status, community residence, and time, the prevalence of PTSD possibly reduces.

These findings build on the previous systematic review by Fazel et al. <sup>(Ref)</sup> by providing updated prevalence estimates based on rigorous diagnostic methods. The prevalence of PTSD reported in this systematic review is higher. In the search conducted by Fazel et. al <sup>ref</sup> 5 studies on PTSD were included but no relevant studies of depression or any other mental illnesses for refugee children and adolescents were found. The fact that this current review was able to contribute data for the prevalence of depression, anxiety, ADHD and ODD highlights the recent expansion and growing significance of the field. Future research could benefit from more longitudinal studies exploring the impact of the refugee experience and the trajectory of recovery for child and adolescent refugees and asylum seekers, as well as the benefit of investigating children and adolescents as separate groups.

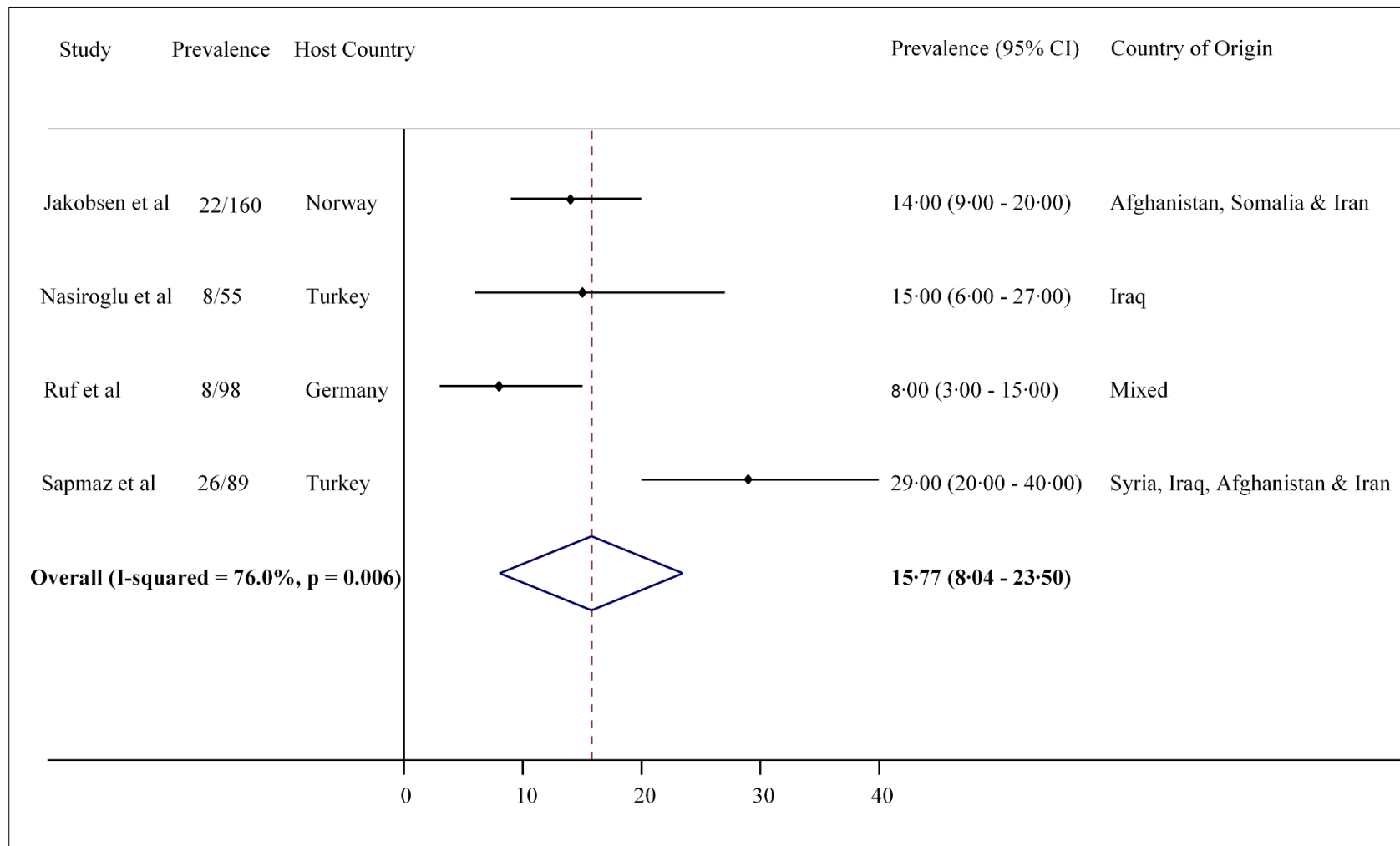
A number of limitations are worthy of note. Few restrictions were placed on characteristics of the refugee experience, such as country of origin, host country, sex or duration of displacement and as a result the meta-analysis yielded high statistical heterogeneity. As a result of the high

and expected heterogeneity, random effects models were used in order to calculate conservative confidence intervals. In this case, conducting meta-regression, which is often used to assess sources of heterogeneity, was not possible due to limited covariates reported in the included studies. However, subgroup analyses were conducted in order to investigate the possible sources of heterogeneity. Some subgroup analyses were not possible due to a lack of reported data such as sex. Country of origin could not be analyzed as many of the study samples were highly diverse. Relevant information pertaining to aspects of the refugee experience were lacking such as number of relocations, which has been shown to increase risk of developing mental illness (NIELSEN 2008). There was limited information reported on the prevalence of comorbid illnesses, with only two studies providing such data. <sup>Daud, Nasiroglu</sup> Only one study explored the relationship between parent diagnosis and child mental health outcomes. <sup>Daud</sup> The role of family, particularly parental psychopathology, is crucial in its ability to mediate or exacerbate child mental health symptoms. (YAYLACI 2018; REED et al 2012; THABET et al 2009; DIAB et al 2009) Future research in the field of child and adolescent refugee mental health should not only focus on conducting more robust studies which incorporate random sampling of populations and rigorous diagnostic methods, but to also clearly characterise the study sample and report relevant details of the refugee experience.

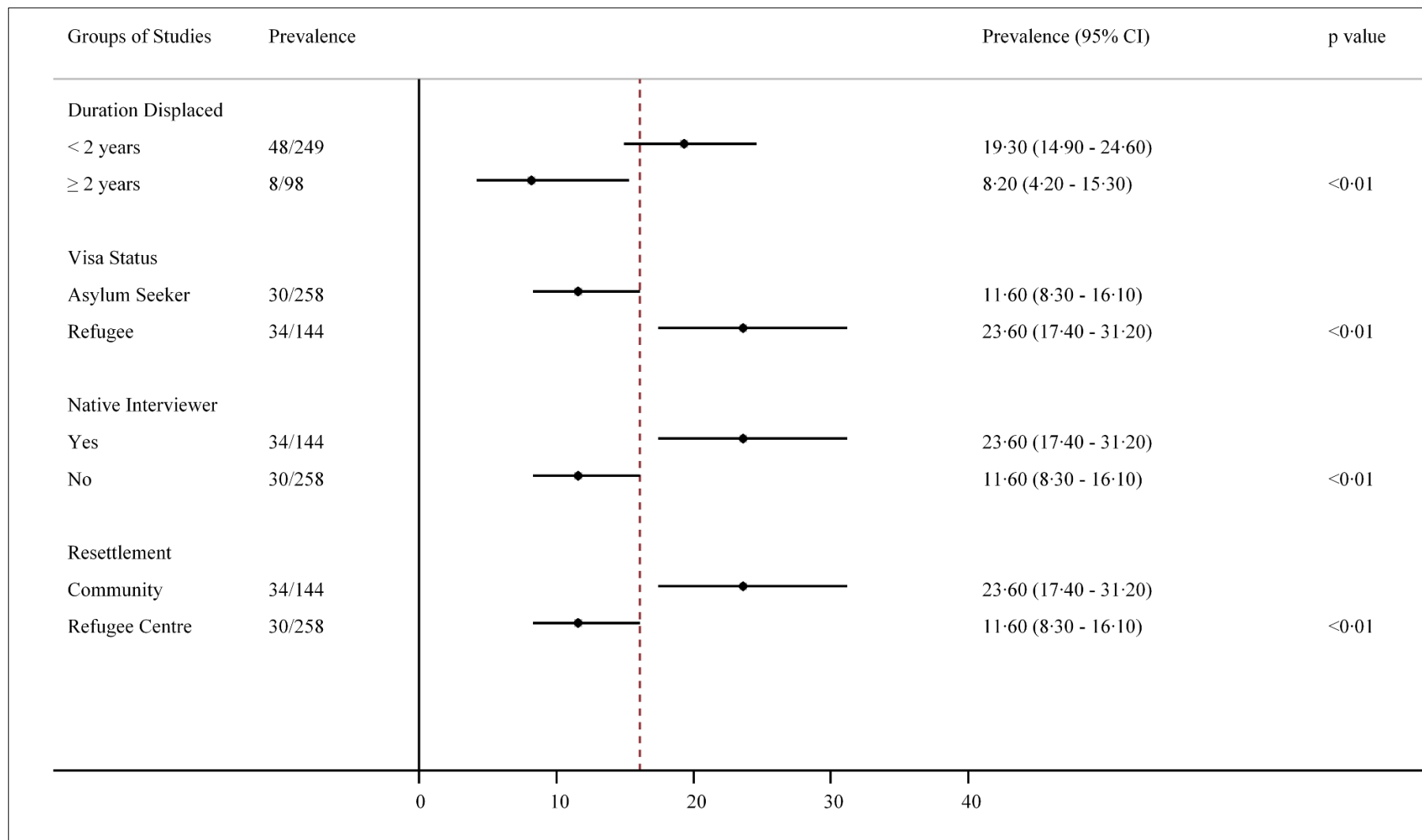
To our knowledge, this is the first systematic review which has implemented strict inclusion criteria regarding the assessment and diagnosis of mental illness in recent child and adolescent refugee and asylum seeker populations. This allowed for the selective analysis of more rigorous studies reporting the prevalence of mental illness based on clinical interviews with trained assessors using validated diagnostic measures. A barrier to the provision of appropriate and informed mental health care for this population is the limited body of research in the field (FAZEL 2018). This review contributes not just a timely update but the largest analysis of PTSD prevalence for this population as well as expanding the current evidence base for other mental

illnesses such as depression, anxiety disorders, ADHD, and ODD. It is also the first systematic review to place no restrictions on publication language, countries of settlement or origin. The majority of studies in this field are often undertaken in high income host countries, which may not be countries of first asylum. While the studies of this review came from nations such as Sweden, Norway, and Germany, it also included key refugee host nations such as Turkey and Malaysia.

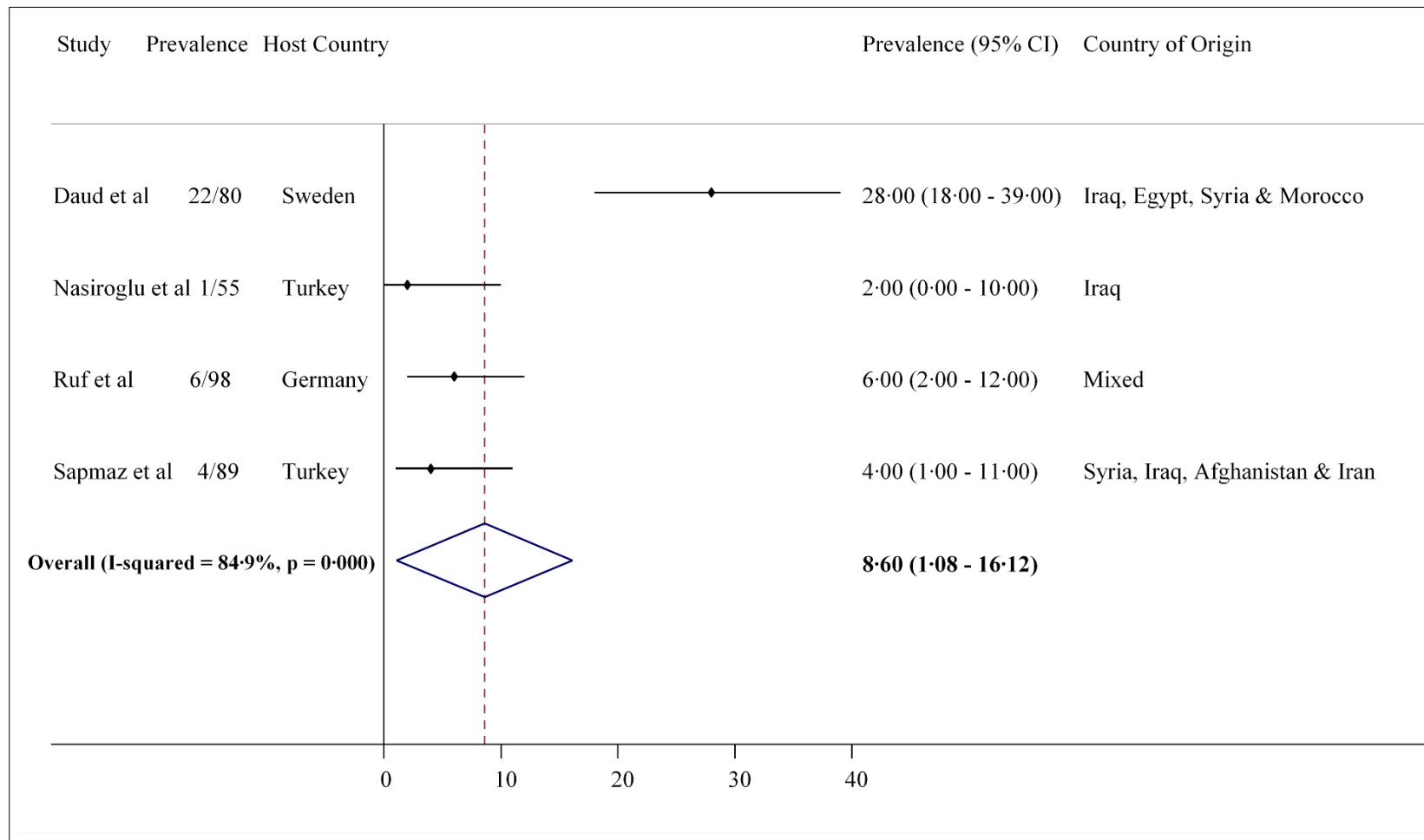
The ever-increasing rates of the forced displacement of children and adolescents pose not only a humanitarian but a significant public health crisis with serious implications for mental health and developmental outcomes. These results highlight not only the impact of the refugee experience on the developing mind but highlight the critical need for immediate mental health intervention to ensure these children and adolescents can successfully integrate and adjust to life post-migration.



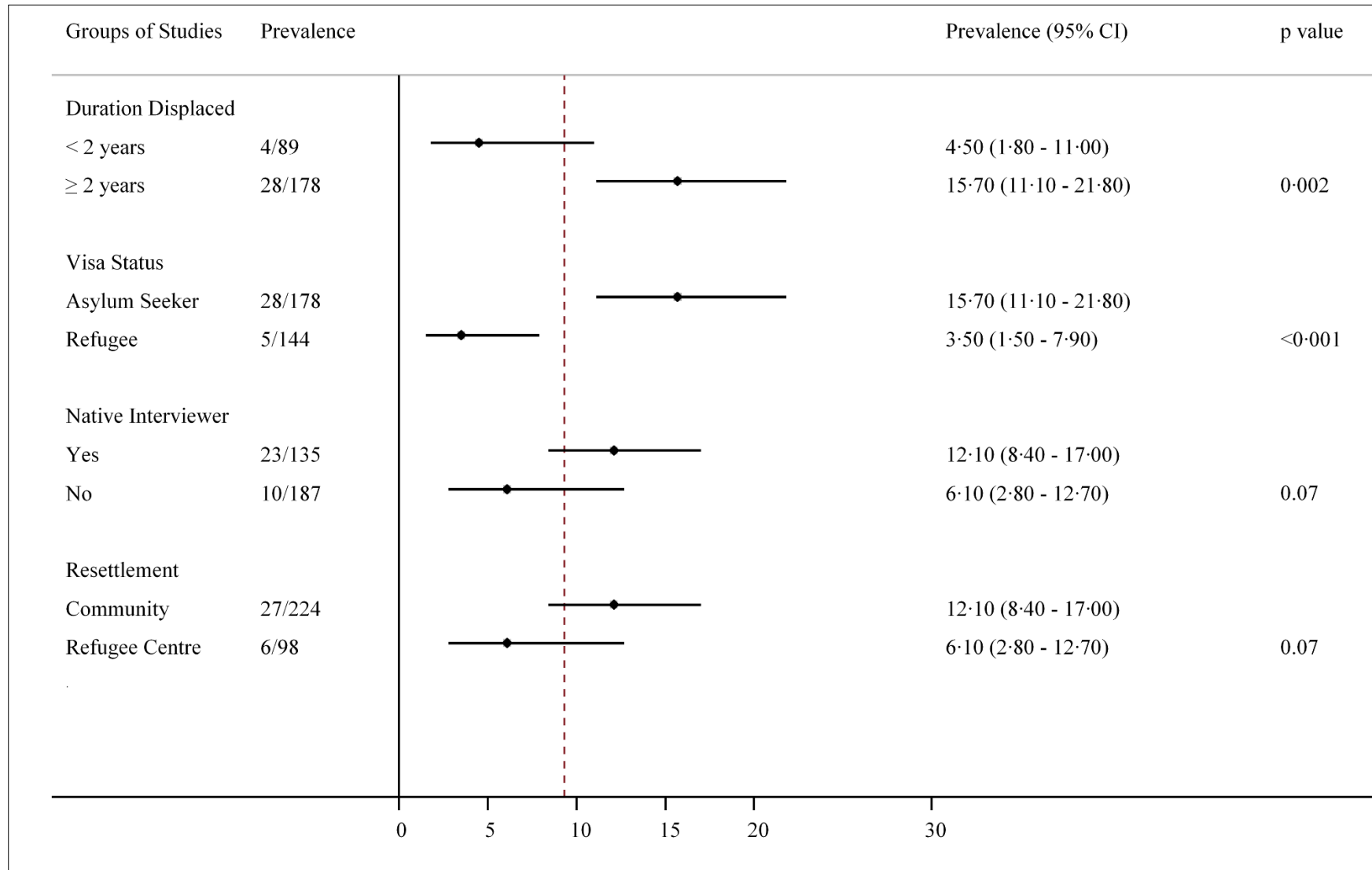
Prevalence of anxiety in child and adolescent refugees and asylum seekers  
Horizontal lines indicate 95% CIs; and open diamond denotes subtotals



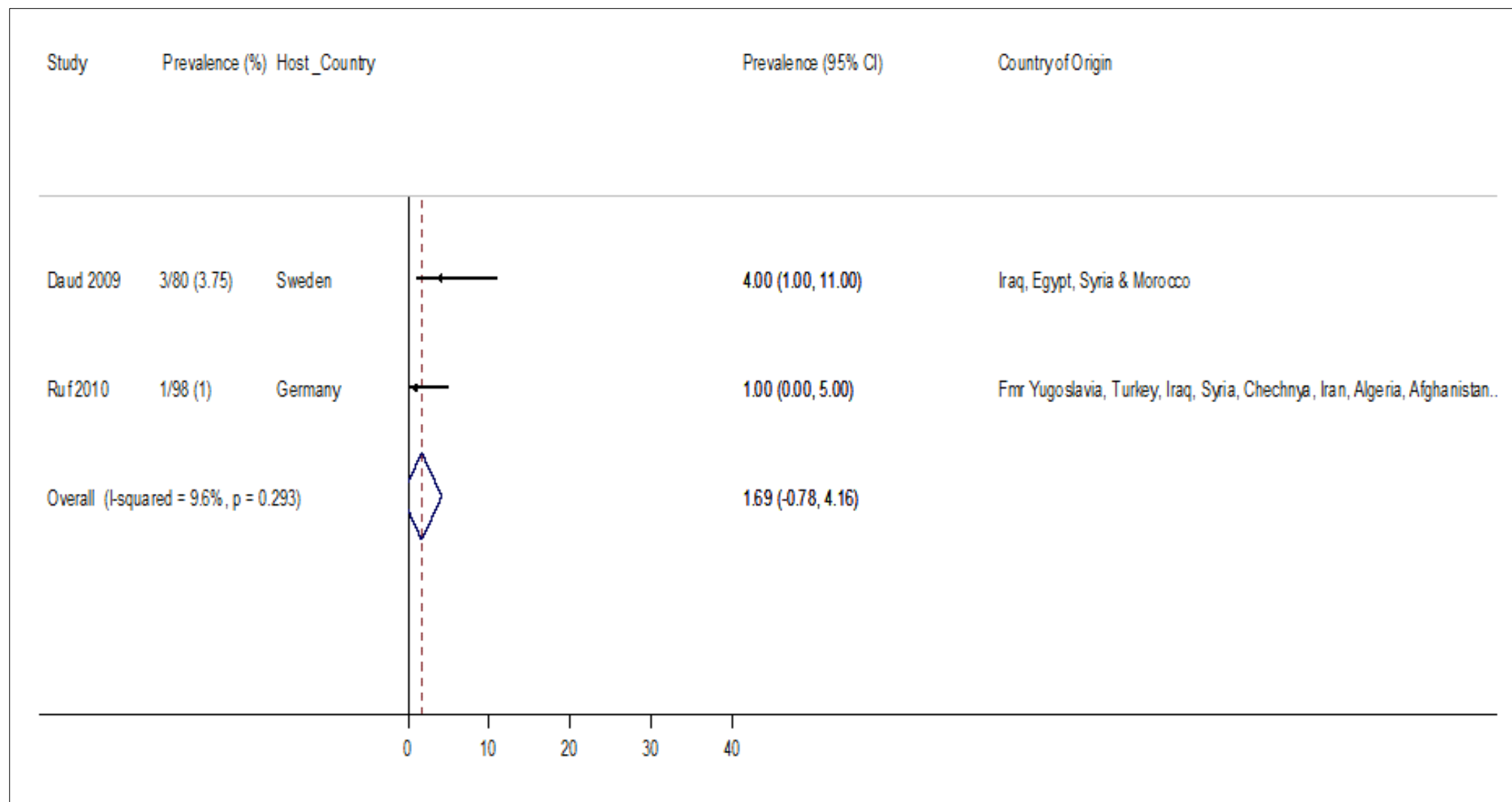
Prevalence of anxiety by various study characteristics, p values derived from random-effects models; horizontal lines indicate 95% CIs.



Prevalence of ADHD in child and adolescent refugees and asylum seekers  
Horizontal lines indicate 95% CIs; and open diamond denotes subtotals



Prevalence of ADHD by various study characteristics p values derived from random-effects models; horizontal lines indicate 95% CIs.



Prevalence of ODD in child and adolescent refugees and asylum seekers  
Horizontal lines indicate 95% CIs; and open diamond denotes subtotals



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## Contributors

RB, MGH, MF, JB, KG & MM contributed to the design of the review and the development of the study’s search terms. All authors approved the systematic review protocol. RB, MGH & GF conducted the screening of results. RB and KG conducted the risk of bias analysis. RB and MGH conducted the data extraction. SR conducted the data analysis and all authors contributed to data interpretation. All authors contributed to sections in the paper and approved the final version of the manuscript.

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Figure 4: Prevalence of depression in child and adolescent refugees and asylum seekers

Horizontal lines indicate 95% CIs; and open diamond denotes subtotals

Figure 5: Prevalence of depression by various study characteristics

*p* values derived from random-effects models; horizontal lines indicate 95% CIs.

**Table 1: Characteristics of Included Studies**

Study	Year	Host Country	Country of Origin	Sampling Method	Diagnostic Instrument	Diagnostic Criteria	Native Interviewer (Y/N)	Sample Size	Mean Age (yrs.)	SD (yrs.)/ Age Range	% Female	No (%) PTSD	No (%) Depression	No (%) Anxiety	No (%) ADHD	Risk of Bias Rating
Ahmad	2008	Sweden	Turkey, Iran, Iraq, Syria, & Lebanon	List of names from child-care centres, school health care and two Kurdish societies in Uppsala, Sweden.	PTSS-C (Post-traumatic Stress Symptoms for Children)	DSM-IV	Y	111	11.6	6 - 18 years	58.6%	8 (7.2%)				Low
Daud	2009	Sweden	Iraq, Egypt, Syria, & Morocco	Recruited through Swedish Red Cross Centre for the treatment of tortured refugees.	DICA-R-C (Diagnostic Interview for Children & Adolescents)	DSM-IV TR	Y	80	Trauma Group: 12.1  Non Trauma Group: 12.5	Trauma Group: 2.1  Non Trauma Group: 2.2  7 - 16 years	50%	32 (40%)			22 (27.5%)	Low
Gosnell	2017	Malaysia	Burma, Pakistan, Sri Lanka, & Iran	Students attending 1 of 8 refugee schools in Kuala Lumpur funded by the UNHCR.	K-SADS-PL (Kiddie Schedule for Affective Disorders and Schizophrenia – Present and Lifetime)	Not Specified	N	90	14.22 years	2.08  10 – 19 years	51%	10 (11%)	12 (13.3%)			Low
Jakobsen	2014	Norway	Afghanistan, Somalia, & Iran	All new arrivals to transit centre in Oslo, aged 15 - 18, were invited to participate each time testing capacity allowed.	WHO WMH-CIDI (World Health Organization World Mental Health-Composite International Diagnostic Interview)	DSM-IV	N	160	16.23	0.83  14 – 20 years	0%	49 (30.6%)	22 (13.75%)	22 (13.75%)		Low
Nasiroglu	2016	Turkey	Iraq	All 58 Yazidi houses with children and adolescents, in the	K-SADS-PL (Kiddie Schedule	DSM-IV	Y	55	11	3.67  6 – 17 years	45%	20 (36.4%)	18 (32.7%)	8 (14.54%)	1 (1.8%)	Moderate

				four villages of Batman, Turkey, were regularly visited for 10 days in the ninth month after their immigration by two child and adolescent psychiatrists.	for Affective Disorders and Schizophrenia –Present and Lifetime)											
Ruf	2010	Germany	Former Yugoslavia, Turkey, Iraq, Syria, Chechnya, Iran, Algeria, Afghanistan, Dagestan, Georgia, Congo, Mongolia, Sudan, Russia, & Azerbaijan	Social workers in 13 different government communal accommodation were contacted and presented with study details. These social workers were asked to invite families living in the asylum seeker accommodation centres to participate.	M.I.N.I KID (Mini-International Neuropsychiatric Interview for Children and Adolescents)	DSM-III	N	98	10.6	2.6 7 – 16 years	53%		3 (3.1%)	8 (8.16%)	6 (6.12%)	Low
Sapmaz	2017	Turkey	Syria, Iraq, Afghanistan, & Iran	Families were contacted using addresses obtained from the immigrant-office headquarters; however, on learning that the families had moved, refugee families who had applied to obstetrics and gynaecology departments of the city hospitals were identified and contacted with two translators who help the families during	K-SADS-PL (Kiddie Schedule for Affective Disorders and Schizophrenia –Present and Lifetime)	DSM-IV	Y	89	9.96	3.98 5 – 18 years	56.2%	8 (9%)	12 (13.5%)	26 (29.2%)	4 (4.5%)	Moderate

				their procedures at the hospital.												
Soykoek	2017	Germany	Syria	Families were contacted using lists of new arrivals provided by the Bayernkaserne reception camp in Munich, Germany.	PTSD-SSI (Post-Traumatic Stress Disorder Semi-Structured Interview) & Kinder -DIPS	DSM-IV	Both (native & interpreters used)	96	7.2	3.68 0 – 14 years	46%	11 (26%)				Low